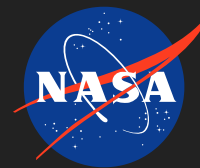


High-Yield Process for Selectively Converting CO₂ to Aromatics and Olefins, Phase I

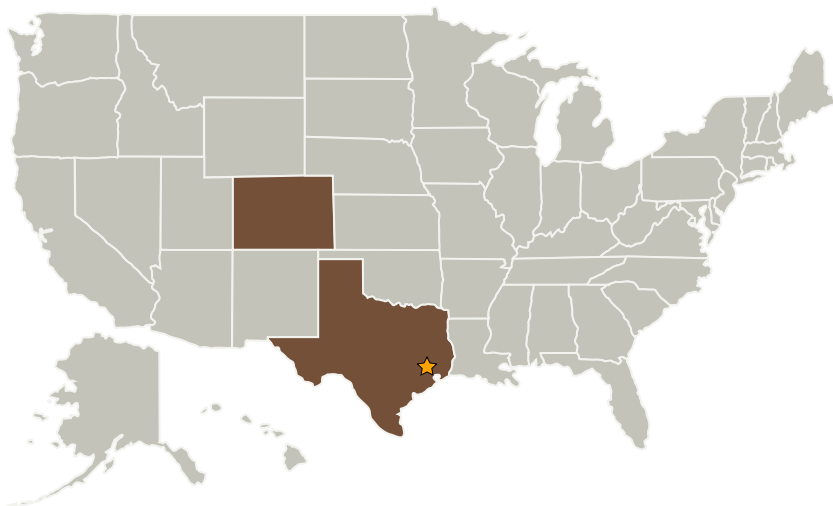
Completed Technology Project (2005 - 2005)



Project Introduction

This proposed Phase I addresses the selective conversion of CO₂ to hydrocarbons via integrated CO₂-to-methanol, methanol-to-olefins, and olefins-to-aromatics processes. Existing pathways to olefins and aromatics via methane exhibit low per-pass conversion. Fischer-Tropsch synthesis can provide much higher conversion, but into a broad spectrum of products. In contrast, it is possible to achieve high conversion and selectivity to specific olefins and aromatics via the proposed methanol pathway, with minimal net hydrogen consumption. Interest stems from in situ resources utilization (ISRU) of planetary (e.g., Martian) resources to reduce mission weight and cost with enhanced safety. Olefins and aromatics are attractive target species because of their high hydrogen leverage as well as their potential utility as fuels and feedstocks for polymers or other chemicals. Phase I will consist of the following: 1) identify, prepare, and characterize the best potential catalysts for principal process stages; 2) test catalysts under representative conditions; 3) identify the best route for converting CO₂ to olefins and aromatics; and 4) estimate potential performance of an integrated system. During Phase II each process stage will be optimized, the stages integrated, and a working breadboard system designed and fabricated.

Primary U.S. Work Locations and Key Partners



High-Yield Process for
Selectively Converting CO₂ to
Aromatics and Olefins, Phase I

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

High-Yield Process for Selectively Converting CO₂ to Aromatics and Olefins, Phase I

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Eltron Research & Development, Inc.	Supporting Organization	Industry	Boulder, Colorado

Primary U.S. Work Locations

Colorado	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James White

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.3 Resource Processing for Production of Mission Consumables